

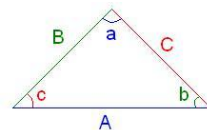
## APPLICATIONS OF TRIG IN 2D AND 3D

### Rules commonly used

Right angled triangles: SOHCAHTOA, Pythagoras ( $h^2 = a^2 + b^2$ )

Non right angled triangles: Sine Rule:  $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine Rule:  $a^2 = b^2 + c^2 - 2bc \cos A$



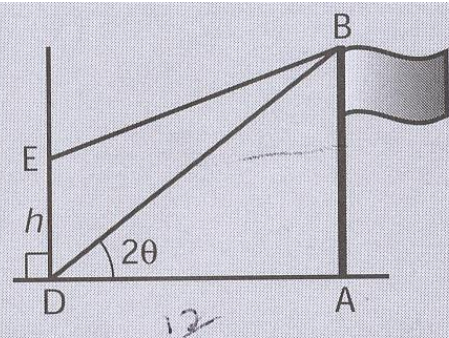
Excellence level questions must include the use of Compound Angles, Double Angles, Sums and Products rules.

### Examples:

- 1) David measures the angle of elevation of the top of a flagpole AB from a point D, 12 metres from A. He climbs  $h$  metres vertically until he reaches the point E where the angle of elevation of B is half what it was at D. If  $\angle BDA = 2\theta$ , show that

$$h = \frac{12t(1+t^2)}{(1-t^2)} \text{ where } t = \tan \theta \text{ and}$$

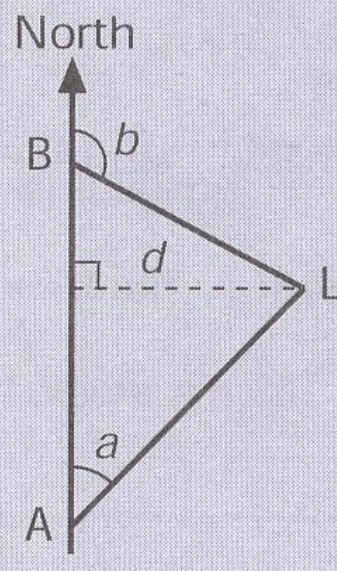
$h$  is the distance DE.



- 2) A ship is sailing due north at a constant speed. When at position A, a lighthouse L is on a bearing of  $a$  degrees. One hour later, when the ship is at the point B, the bearing of L is  $b$  degrees. The shortest distance between the ship and the lighthouse is  $d$  km.

a. Prove that  $AB = d(\cot a - \cot b)$ .

b. Hence prove that  $AB = \frac{d \sin(b-a)}{\sin a \sin b}$ .



Delta Ex 36.1 pg 348 – 350